

**BUILDING STANDARDS COMMISSION**

2525 Natomas Park Drive, Suite 130  
Sacramento, California 95833-2936  
(916) 263-0916 FAX (916) 263-0959



February 15, 2011

Martin Von Raesfeld, Fire Marshal  
Fire Prevention Division  
City of Santa Clara  
1675 Lincoln Street  
Santa Clara, CA 95050

Dear Mr. Von Raesfeld:

This letter is to acknowledge receipt on January 12, 2011 of the City of Santa Clara submittal pertaining to Ordinance No. 10-7796 with findings and is acceptable for filing. Your filing attests to your understanding that according to Health and Safety Code Section 17958.7 no modification or change to the California Building Standards Code shall become effective or operative for any purpose until the finding and the modification or change have been filed with the California Building Standards Commission (the Commission).

This letter attests only to the filing of these local modifications with the Commission, which is not authorized by law to determine the merit of the filing.

As a reminder, local modifications are specific to a particular edition of the Code. They must be readopted and filed with the Commission in order to remain in effect when the next triennial edition of the Code is published. In addition, should you receive Fire Protection District ordinances for ratification, it is required to submit the ratified ordinances to the Department of Housing and Community Development [H&SC Section 13869.7(c)], attention State Housing Law Program Manager, rather than the Commission.

If you have any questions or need any further information, you may contact me at (916) 263-0916.

Sincerely,

A handwritten signature in black ink, appearing to read "Enrique M. Rodriguez".

Enrique M. Rodriguez  
Associate Construction Analyst

cc: Chron  
Local Filings



Fire Department  
Fire Chief Phil Kleinheinz

January 3, 2011

California Building Standards Commission  
2525 Natomas Park Drive, Suite 130  
Sacramento, CA 95833

Re: Submittal of Findings of Facts for Amendments to Building Standards of the  
International Fire Code

To Whom It May Concern:

Please find attached the findings of fact for the amendments to the International Fire Code,  
which have been incorporated into the Santa Clara Municipal Fire and Environmental Code.

If you should have any questions regarding the findings of fact, please do not hesitate to call  
me at (408) 615-4971.

Sincerely,

A handwritten signature in black ink, appearing to read "M. Von Raesfeld".

Martin Von Raesfeld  
Fire Marshal

MV:ng

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RECEIVED  
FEB 12 2011  
SANTA CLARA  
BUILDING  
COMMISSION

Fire Prevention Division  
1675 Lincoln Street  
Santa Clara, CA 95050  
FAX (408) 241-3006



**RESOLUTION NO. 10-7796**

**A RESOLUTION OF THE CITY OF SANTA CLARA,  
CALIFORNIA, FINDING AND DETERMINING THE NEED  
FOR MODIFICATIONS TO THE INTERNATIONAL FIRE  
CODE, 2009 EDITION AS ADOPTED AND AMENDED BY  
THE STATE OF CALIFORNIA**

**BE IT RESOLVED BY THE CITY OF SANTA CLARA AS FOLLOWS:**

**WHEREAS**, the State of California recently adopted and amended the 2009 International Fire Code to establish the 2010 California Fire Code;

**WHEREAS**, pursuant to the California Health and Safety Code, §§18941.5 and 17958, local municipalities may amend the International Fire Code to impose more restrictive requirements that are reasonably necessary to ensure that an acceptable level of fire and life safety is maintained within their jurisdiction;

**WHEREAS**, the City of Santa Clara Fire Department has worked with other Santa Clara County Fire Agencies in the Santa Clara County Fire Code Work Group to develop amendments to the California and International Fire Code; and,

**WHEREAS**, the City of Santa Clara ("City") finds it necessary to amend the 2009 International Fire Code and 2010 California Fire Code, as adopted and amended by the State of California, in order to maintain a reasonable degree of fire and life safety within the City because of local climatic, geographic, and topographical conditions.

**NOW THEREFORE, BE IT FURTHER RESOLVED BY THE CITY OF SANTA CLARA  
AS FOLLOWS:**

That it finds and determines there is a need to adopt the changes or modifications because of local climatic, geological, and topographical conditions.

## General Findings

### 1. Climatic:

A. **Precipitation.** Average annual rainfall for the City is approximately 15.08 inches per year. The area experienced record-breaking rainfall in 1983 when 32.57 inches of rain fell. As a result of the record rainfall, the region experienced widespread flooding. Conversely, since 1980, the area has experienced 8 years of below-average rainfall. During the years of 1988 through 1991, the area experienced drought conditions that required water-use restrictions.

B. **Relative Humidity.** The average relative humidity ranges from 50% during daytime to 70% at night. It drops to approximately 40% during the summer months and occasionally exceeds 80% in the winter months.

C. **Temperatures.** Temperatures have been recorded as high as 109° F. and as low as 19°F. Average summer highs are in the 78°–82° F. range and winter lows average 28°–35° F.

D. **Winds.** Prevailing winds are from the Northwest. However, winds are experienced from virtually every direction throughout the year. Velocities are generally in the 5-mph to 15-mph range, with a mean speed of 5.8 mph, and gusts ranging from 7.4 mph to 30 mph, particularly during the summer months. Extreme winds, up to 60 mph, have been recorded.

E. **Climatic Summary.** These local climatic conditions affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to vegetation and combustible construction. The winds experienced in the Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City. During structure fires, winds can carry embers and burning brands to other structures, spreading the fire and posing the risk of conflagration. In

building fires, winds can force fires back into the building and can create a “blowtorch effect,” increasing the fire’s intensity and speed of spread throughout the building.

## **2. Geological and Topographical:**

A. **Geographic Location.** The City of Santa Clara is located in Santa Clara Valley and is approximately 45 miles south of San Francisco and 382 miles north of Los Angeles.

B. **Seismic Location.** The City of Santa Clara is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes its taller and older structures particularly vulnerable to damage caused by significant seismic events. The relatively young geological processes that created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments, the City of Santa Clara is located in a very high-risk seismic zone. This zone includes the City’s industrial area, which contains the largest concentration of hazardous materials.

C. **Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake may potentially cause greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City have combustible roofs, which add significantly to the risk of structural fires after an earthquake. Should a significant seismic event occur, hazardous materials, particularly toxic gases, could pose the greatest threat to the largest number of people. In the event of a widespread catastrophic event, public safety service resources would be seriously impacted, and possibly unavailable to effectively respond to all emergencies. Other variables increase the risk from fire and hazardous material releases after a major earthquake including:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. The time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (woodframe) in the residential, mercantile and light industry zones.

D. **Soil Conditions.** The City lies at the southern end of San Francisco Bay and is built atop the alluvial deposits that surround the margins of the Bay. The alluvium was created by the flooding of the many streams emptying into the San Francisco Bay depression, and from intermittent seawater inundation that has occurred over the last 2 or 3 million years. The areas closest to the Bay are overlain by unconsolidated fine silty clay, known as Bay Mud, which varies in thickness from a few feet to as much as 30 feet. Generally, the older, more stable alluvium is located to the south and the younger, less stable material is located to the north. Bedrock lies beneath the area at depths of 300 feet or more.

E. **Topography.** The topography is essentially flat, dropping from an elevation of 94 feet to sea level. The slope across the City is in a northeasterly direction from the high point in the southwest corner to the Bay. The average slope is approximately 0.9%.

F. **Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire

hazards presented to the Fire Department. Beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 and 1989 earthquakes and the poor performance of alluvial deposits during earthquakes, the City of Santa Clara areas could be subject to severe damage as a result of a major earthquake.

### **3. Related City Information:**

A. **Size and Population.** The City has an area 19.3 square miles in size and a current population of approximately 114,238. The City of Santa Clara is the third largest city in Santa Clara County.

B. **Future Development.** The City is a community that has the present capacity to develop over 5,000 new residential units within the next ten years. The development is targeted in the northern areas of the City and will primarily be multi-family configurations.

C. **Public Safety.** The City of Santa Clara utilizes a Police Department comprised of 228 employees utilizing all modern equipment. The Fire Department is comprised of 176 employees in ten stations located throughout the City. The City Fire Department Insurance Service Organization Classification rating is Class 2, with adjacent areas rated between Class 3 and Class 9.

The City's fire prevention philosophy requires that fire detection and suppression occur as quickly as possible to minimize loss of property and life. For these reasons, the most advanced fire detection, alarm and suppression systems are required for most new construction within the City.

D. **Traffic.** The number of vehicle miles driven in the City has steadily increased over the past 20 years. Considerable effort is being made to improve conditions impacting traffic

in order to ease the crush of commuters through the City. Due to the City's high concentration of jobs, much of the peak traffic (about 75%) is made by nonresidents travelling to or through Santa Clara. The impact of planned developments and traffic flow will continue to affect the delivery of emergency services.

E. **Industry.** The City of Santa Clara is the site of more than 300 manufacturing plants and numerous research industries. The leading group classes of products are electronic equipment, communication equipment and fiberglass. Many of these manufacturing and research industries use toxic, flammable and explosive chemicals and other materials in potentially hazardous combinations. Special precautions are required to minimize the risk of damage to adjoining persons and properties.

Approximately 3,000 acres in the City limits are zoned for light and heavy industry; only 100 acres, of this area remains to be developed. Available industrial parcels range in size from 20,000 square feet to 85 acres, many of which are in the 12 industrial parks or districts.

F. **Proximity of Industrial and Residential Uses.** High-density residential uses are located near high-risk industries, necessitating special health and safety precautions.

G. **Transportation.** The City of Santa Clara is divided by an interstate highway, which could potentially negatively affect fire suppression response times.

H. **Buildings, Landscaping and Clearances.** Many of the designs of the newer large buildings and building complexes greatly limit visibility, approach and accessibility by Public Safety resources. Many houses and other buildings with wood roofs and/or sidings are so close together that fire can readily spread by both radiation and convection.

I. **Water Supply.** The City of Santa Clara supplies its own water for commercial and residential needs. The maximum supply capacity is 64 million gal/day (MGD). The average

consumption is 19 MGD. Water mains range in size from 4 to 27 inches.

J.     **Electric Power.** The City's electrical utility, Silicon Valley Power supplies the City's residents, as well as commercial and industrial customers, with electric power. The capacity of the City's receiving station is 668 MVA, with a maximum demand load of 400 MV. The interconnection voltage is 115kV and transmission voltage is 60kV. The distribution feeder voltage is 12kV and customer delivery voltage varies.

**Specific Findings.** In addition to changes justified on administrative grounds or by all of the general findings, several substantive sections are justified specifically.

## **AMENDED BUILDING STANDARDS INCLUDED IN THE SANTA CLARA MUNICIPAL FIRE AND ENVIRONMENTAL CODE**

The following amendments are considered building standards and are listed with the applicable climatic, geologic and topographic conditions:

**316.6 Roof Guardrails At Interior Courts.** Roof openings into interior courts that are bounded on all sides by building walls shall be protected with guardrails. The top of the guardrail shall not be less than 42 inches in height above the adjacent roof surface that can be walked on. Intermediate rails shall be designed and spaced such that a 12-inch diameter sphere cannot pass through.

**Exception:** Where the roof opening is greater than 600 square feet in area.

**General Finding:** Emergency roof operations performed by fire department personnel pose a significant danger of falls for firefighters working on roofs. Weather conditions can have a direct effect on the intensity of structure fires. Time of day, smoke conditions and wind can increase the risk of falls from roofs. Roof guardrails at interior courts can significantly reduce the hazard.

### **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the

building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

## **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

**Seismic Location.** The City of Santa Clara is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes it particularly vulnerable to damage to taller and older structures caused by seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of a widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;

3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

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**903.2 Where Required.** Approved automatic sprinkler systems in new buildings and structures and in existing modified buildings and structures, shall be provided in the locations described in this section. Automatic fire sprinklers shall be installed per the requirements set forth in Sections 903.2.1 through 903.2.13 and as follows, whichever is the more restrictive:

1. An automatic sprinkler system shall be provided throughout all new buildings that have a gross floor area in excess of 3,600 square feet or that are three (3) or more stories in height.
2. An automatic sprinkler system shall be provided throughout all existing buildings when modifications are made that increase the gross floor area to more than 3,600 square feet or increase the number of stories to three (3) or more.

**Exception:** One-time additions to existing buildings made after 01/01/2008 that do not

exceed 500 square feet in gross floor area.

3. An automatic sprinkler system shall be provided throughout all new buildings located in the designated Wildland-Urban Interface areas.

**Exception:** Any non-residential accessory structures to single family residences that have a gross floor area of 500 square feet or less.

4. An automatic sprinkler system shall be provided throughout all existing buildings located in the designated Wildland-Urban Interface areas when modifications are made that increase the gross floor area.

**Exception:** One-time additions to existing buildings made after 01/01/2008 that do not exceed 500 square feet in gross floor area.

**Delete Exception #1 to 903.2**

**General Finding:** The weather, including high temperatures and winds, can significantly increase the chance that a structure fire can spread to neighboring properties. Automatic fire sprinkler systems have a proven track record for containing fires and allowing for the control of fires by fewer firefighters than structures not protected by fire sprinklers. Structures equipped with automatic fire sprinklers significantly reduce the likelihood that a fire will spread to neighboring properties.

**CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to

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#### **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

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Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a

major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
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**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

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**1404.8 Fire Walls.** When firewalls are required, the wall construction shall be completed (with all openings protected) immediately after the building is sufficiently weather-protected at the location of the wall(s).

**General Finding:** The risk of fire for a building is usually greatest during its construction phase. The intensity of a fire involving a building under construction is directly influenced by weather conditions. Firewalls have demonstrated effectiveness in aiding in the control of fires involving

buildings under construction.

#### **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

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**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major

earthquake.

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**[B] 1411.1 Stairways Required.** ~~Where a building has been constructed to a building height of 50 feet (15,240 mm) or four stories, or where an existing building exceeding 50 feet (15,240 mm) in building height is altered, at least one temporary lighted stairway shall be provided unless one or more of the permanent stairways are erected as the construction progresses shall be provided unless one or more of the permanent stairways are erected as the construction progresses.~~

Each level above the first story in new multi-story buildings that require two exit stairways shall be provided with at least two usable exit stairways after the floor decking is installed. The stairways shall be continuous and discharge to grade level. Stairways serving more than two floor levels shall be enclosed (with openings adequately protected) after exterior walls/windows are in place. Exit stairs in new and in existing, occupied buildings shall be lighted and maintained clear of debris and construction materials at all times.

**Exception:** For new multi-story buildings, one of the required exit stairs may be obstructed on not more than two contiguous floor levels for the purposes of stairway construction (i.e., installation of gypsum board, painting, flooring, etc.).

**General Finding:** The risk of fire for a building is usually greatest during its construction phase. The intensity of a fire involving a building under construction is directly influenced by weather conditions. Since a building under construction does not have active fire protection systems, it is necessary to have identified and unobstructed means egress for the occupants.

#### **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

#### **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

**Seismic Location.** The City is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes it particularly vulnerable to damage to taller and older structures caused by seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

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**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

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**Section 1411.1.1 Required Means of Egress.** All new buildings under construction shall have at least one unobstructed means of egress. All means of egress shall be identified in the Fire Protection Plan.

**General Finding:** The risk of fire for a building is usually greatest during its construction phase. The intensity of a fire involving a building under construction is directly influenced by weather conditions. Since a building under construction does not have active fire protection systems, it is necessary to have identified means of egress for the occupants.

#### **CLIMATIC FINDINGS:**

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**1907.6 Fire Protection Water Supply System.** An approved fire protection water supply and hydrant system suitable for the fire hazard involved shall be provided for open storage yards and processing areas. Hydrant systems shall be installed in accordance with NFPA 24.

**General Finding:** Fires involving the exterior storage of combustible materials are directly affected by weather conditions. The intensity and the likelihood that the fire could spread to neighboring properties can be increased by high temperatures and wind. The effective control and containment of fires involving combustible materials is directly dependent on the availability of an adequate water supply.

#### **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus

spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

#### **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

**Seismic Location.** The City is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes it particularly vulnerable to damage to taller and older structures caused by seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;

2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

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**1908.11 Fire Protection Water Supply System.** An approved fire protection water supply and hydrant system suitable for the fire hazard involved shall be provided for open storage yards and processing areas. Hydrant systems shall be installed in accordance with NFPA 24.

**General Finding:** Fires involving the exterior storage of combustible materials are directly affected by weather conditions. The intensity and the likelihood that the fire could spread to neighboring properties can be increased by high temperatures and wind. The effective control and containment of fires involving combustible materials is directly dependent on the availability of an adequate water supply.

## **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

## **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

**Seismic Location.** The City is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes it particularly vulnerable to damage to taller and older structures caused by seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to

the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
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7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

**2703.2.2.1 Design and Construction.** Piping, tubing, valves, fittings and related components used for hazardous materials shall be in accordance with the following:

1. Piping, tubing, valves, fittings and related components shall be designed and fabricated from materials compatible with the material to be contained and shall be of adequate strength and durability to withstand the pressure, structural and seismic stress, and exposure to which they are subject.

2. Piping and tubing shall be identified in accordance with ASME A13.1 and Santa Clara County Fire Chiefs Marking Requirements and Guidelines for Hazardous Materials and Hazardous Waste to indicate the material conveyed.

3. Readily accessible manual valves or automatic remotely activated fail-safe emergency shutoff valves shall be installed on supply piping and tubing at the following locations:

- A. The point of use.
- B. The tank, cylinder or bulk use.

4. Manual emergency shutoff valves and controls for remotely activated emergency shutoff valves shall be identified and the location shall be clearly visible accessible and indicated by means of a sign.

5. Backflow prevention or check valves shall be provided when the backflow of hazardous materials could create a hazardous condition or cause the unauthorized discharge of hazardous materials.

6. Where gases or liquids having a hazard ranking of:

- A. Health Class 3 or 4
- B. Flammability Class 4
- C. Instability Class 4

in accordance with NFPA 704 are carried in pressurized piping above 15 pounds per square inch gauge (psig)(103 Kpa), an approved means of leak detection, emergency shutoff or excess flow control shall be provided. Where the piping originates from within a hazardous material storage room or area, the excess flow control shall be located within the storage room or area. Where the piping originates from a bulk source, the excess flow control shall be located as close to the bulk source as practical.

**Exceptions:**

1. Piping for inlet connections designed to prevent backflow.
2. Piping for pressure relief devices.
7. Secondary containment or equivalent protection from spills shall be provided for piping for liquid hazardous materials and for highly toxic and toxic corrosive gases above threshold quantities listed in Tables 3704.2 and 3704.3. Secondary containment includes, but is not limited to double walled piping.

**Exceptions:**

1. Secondary containment is not required for toxic corrosive gases if the piping is constructed of inert materials.
2. Piping under sub-atmospheric conditions if the piping is equipped with an alarm and fail-safe-to-close valve activated by a loss of vacuum.
8. Expansion chambers shall be provided between valves whenever the regulated gas may be subjected to thermal expansion. Chambers shall be sized to provide protection for piping and instrumentation and to accommodate the expansion of regulated materials.

**General Finding:** The accidental release of hazardous materials can threaten large numbers of people and the environment due to the spread of the gases by winds. Secondary containment and

expansion chambers are designed to help reduce the chance of an accidental release of hazardous materials.

#### **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

#### **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

**Seismic Location.** The City is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes it particularly vulnerable to damage to taller and older structures caused by seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara

Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

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**2703.2.2.2 Additional Regulation for Supply Piping for Health Hazard Materials.** Supply piping and tubing for gases and liquids having a health hazard ranking of 3 or 4 in accordance with NFPA 704 shall be in accordance with ASME B31.3 and the following:

1. Piping and tubing utilized for the transmission of highly toxic, toxic or highly volatile corrosive liquids and gases shall have welded, ~~threaded~~ or ~~flanged~~ brazed connections throughout except for connections within an ~~ventilated~~ exhausted enclosure if the material is a gas, or an approved method of drainage or containment is provided for connections if the material is a liquid.

2. Piping and tubing shall not be located within corridors, within any portion of a means of egress required to be enclosed in fire-resistance-rated construction or in concealed spaces in areas not classified as Group H Occupancies.

**Exception:** Piping and tubing within the space defined by the walls of corridors and the floor or roof above or in concealed space above other occupancies when installed in accordance with Section 415.8.6.3 of the California Building Code as required for Group H-5 Occupancies.

3. All primary piping for highly toxic, toxic and moderately toxic gases shall pass a helium leak test of  $1 \times 10^{-9}$  cubic centimeters/second where practical, or shall pass testing in accordance with an approved, nationally recognized standard. Tests shall be conducted by a qualified "third party" not involved with the construction of the piping and control systems.

**General Finding:** The accidental release of hazardous materials can threaten large numbers of

people and the environment due to the spread of the gases by winds. Threaded or flanged connections pose a significant risk of a release of hazardous materials.

#### **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

#### **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

**Seismic Location.** The City is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes it particularly vulnerable to damage to taller and older structures caused by seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the

potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes,

areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

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**3704.1.4 Automatic Shut-Off Valve.** An automatic shut-off valve, which is of a fail-safe to close design, shall be provided to shut off the supply of highly toxic gases for any of the following:

1. Activation of a manual fire alarm system.
2. Activation of the gas detection system.
3. Failure of emergency power.
4. Failure of primary containment.
5. Seismic activity.
6. Failure of required ventilation.
7. Manual activation at an approved remote location.

**General Finding:** The accidental release of toxic gases can threaten large numbers of people due to the spread of the gases by winds. The safe use of toxic gases is dependent upon a number of safety systems. Failure of any of the systems can pose a significant hazard to people in the area. Automatic shut off valves can be used to shut off the flow of toxic gas as a result of an emergency or the failure of a safety system.

#### **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one

another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

#### **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

**Seismic Location.** The City is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes it particularly vulnerable to damage to taller and older structures caused by seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a

major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

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**3704.1.9 Fire Extinguishing Systems.** Buildings and covered exterior areas for storage and use of materials regulated by this Chapter shall be protected by an automatic fire sprinkler system in accordance with NFPA 13. The design of the sprinkler system for any room or area where highly toxic, toxic and moderately toxic gases are stored, handled or used shall be in accordance with Section 2704.5.

**General Finding:** Emergencies involving outdoor storage of toxic gases can significantly pose a

risk to surrounding areas due to the spread of the gas by winds. The installation of sprinklers can help to contain a fire and protect other containers from fire exposure.

#### **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

#### **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

**Seismic Location.** The City is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes it particularly vulnerable to damage to taller and older structures caused by seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the

potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
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**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes,

areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

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**3704.1.6 Local Gas Shut Off.** Manual activation controls shall be provided at locations near the point of use and near the source, as approved by the fire code official. The fire code official may require additional controls at other places, including, but not limited to, the entry to the building, storage or use areas, and emergency control stations. Manual activated shut-off valves shall be of a fail-safe-to-close design.

**General Finding:** The accidental release of toxic gases can threaten large numbers of people due to the spread of the gases by winds. Local gas shut offs can be used by personnel to shut off the flow of gas from a safe location thereby stopping the flow of gas from the source.

#### **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

#### **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

**Seismic Location.** The City is situated on alluvial soils between San Francisco Bay and the San

Andreas Fault zone. The City's location makes it particularly vulnerable to damage to taller and older structures caused by seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;

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**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

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**3704.1.17 Seismic Shutoff Valve.** An automatic seismic shut-off valve, which is of a fail-safe to close design, shall be provided to shut off the supply of highly toxic, toxic and moderately toxic gases with an LC<sub>50</sub> less than 3000 parts per million upon a seismic event within 5 seconds of a horizontal sinusoidal oscillation having a peak acceleration of 0.3G (1.47m/sec<sup>2</sup>) and a period of 0.4 seconds.

**General Finding:** The City of Santa Clara is located in an area that experiences significant seismic activity. Automatic seismic shut off valves are designed to shut off the flow of toxic gases from the source thereby reducing the chance of accidental release after a significant earthquake.

#### **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they

relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

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**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively

respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
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**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

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**3704.2.2.7 Treatment Systems.** The exhaust ventilation from gas cabinets, exhausted enclosures and gas rooms, and local exhaust systems required in Section 3704.2.2.4 and 3704.2.2.5 shall be directed to a treatment system. The treatment system shall be utilized to handle the accidental release of gas and to process exhaust ventilation. The treatment system

shall be designed in accordance with Sections 3704.2.2.7.i through 3704.2.2.7.5 and Chapter 5 of the California Mechanical Code.

**Exceptions:**

1. Highly toxic, toxic and moderately toxic gases storage. A treatment system is not required for cylinders, containers and tanks in storage when all of the following controls are provided:

1.1. Valve outlets are equipped with gas-tight outlet plug or caps.

1.2. Handwheel-operated valves have handles secured to prevent movement.

1.3. Approved containment vessels or containment systems are provided in accordance with Section 3704.2.2.3.

~~2. Toxic gases use. Treatment systems are not required for toxic gases supplied by cylinders or portable tanks not exceeding 1,700 pounds (772 kg) water capacity when the following are provided:~~

~~2.1. A listed or approved gas detection system with a sensing interval not exceeding 5 minutes.~~

~~2.2. A listed or approved automatic closing fail-safe valve located immediately adjacent to cylinder or portable tank valves. The fail-safe valve shall close when gas is detected at the PEL by a gas detection system monitoring the exhaust system at the point of discharge from the gas cabinet, exhausted enclosure, ventilated enclosure or gas room. The gas detection system shall comply with Section 3704.2.2.10.~~

**General Finding:** Catastrophic releases of toxic gases can threaten large numbers of people due to the spread of the gases by winds. Treatment systems are designed to treat catastrophic release reducing the hazard posed by the release.

## **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

## **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

**Seismic Location.** The City is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes it particularly vulnerable to damage to taller and older structures caused by seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to

the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

**3704.3.3 Outdoor Storage Weather Protection For Portable Tanks and Cylinders.** Weather protection in accordance with Section 2704.13 and this section shall be provided for portable tanks and cylinders located outdoors and not within gas cabinets or exhausted enclosures. The storage area shall be equipped with an approved automatic sprinkler system in accordance with Section ~~903.3.1.1~~ 2704.5.

**Exception:** ~~An automatic sprinkler system is not required when:~~

~~1. All materials under the weather protection structure, including hazardous materials and the containers in which they are stored, are noncombustible.~~

~~2. The weather protection structure is located not less than 30 feet (9144mm) from combustible materials or structures or is separated from such materials or structures using a fire barrier complying with Section 3704.3.2.1.1.~~

**General Finding:** Emergencies involving outdoor storage of toxic gases can pose a significant risk to surrounding areas due to the spread of the gas by winds. The installation of sprinklers can help to contain a fire and protect other containers from fire exposure.

#### **CLIMATIC FINDINGS:**

**Climatic Summary.** The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus

spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

## **GEOLOGIC AND TOPOGRAPHIC CONDITIONS:**

**Seismic Location.** The City is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes it particularly vulnerable to damage to taller and older structures caused by seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

**Seismic Events, Fire and Hazardous Material Releases.** Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

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3. The extent of roadway damage and/or amount of debris blocking the roadways;
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**Geographical and Topographical Summary.** The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

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BE IT FURTHER RESOLVED that the City Clerk is hereby directed to cause a copy of this Resolution, together with the ordinances making the changes and modifications to the enumerated uniform codes, to be filed with the California Buildings Standards Commission and the State Department of Housing and Community Development.

I HEREBY CERTIFY THE FOREGOING TO BE A TRUE COPY OF A RESOLUTION PASSED AND ADOPTED BY THE CITY COUNCIL OF THE CITY OF SANTA CLARA, CALIFORNIA, AT A REGULAR MEETING THEREOF HELD ON THE 9<sup>th</sup> DAY OF NOVEMBER, 2010, BY THE FOLLOWING VOTE:

|            |             |                                                               |
|------------|-------------|---------------------------------------------------------------|
| AYES:      | COUNCILORS: | Caserta, Kennedy, Kornder, Matthews and Moore and Mayor Mahan |
| NOES:      | COUNCILORS: | None                                                          |
| ABSENT:    | COUNCILORS: | McLeod                                                        |
| ABSTAINED: | COUNCILORS: | None                                                          |

ATTEST:

  
\_\_\_\_\_  
ROD DIRIDON, JR.  
CITY CLERK  
CITY OF SANTA CLARA

Attachments incorporated by reference:  
None

